IN THE CLAIMS

1. (Previously Presented) A method for selectively etching a sacrificial light absorbing material over a dielectric material on a substrate, comprising:

providing a substrate comprising a sacrificial light absorbing material and a dielectric material to a process chamber;

supplying to the process chamber a process gas mixture comprising a hydrofluorocarbon gas, a nitrogen-containing gas, an oxygen-containing gas, an inert gas, and at least one of a hydrogen-containing gas or a fluorine-rich fluorocarbon gas; and

dissociating and ionizing the process gas mixture to etch the sacrificial light absorbing material.

2. (Cancelled)

3. (Original) The method of claim 1 wherein the hydrofluorocarbon gas is CH_3F, the flow rate is between about 5 sccm to about 500 sccm and the flow ratio of the hydroflurocarbon gas to the oxygen-containing gas is between about 1 to about 20.

4. (Previously Presented) The method of claim 1 wherein the hydrogen-containing gas is H_2, the flow rate is less than about 500 sccm and the flow ratio of the hydrogen-containing gas to the oxygen-containing gas is less than about 5.

5. (Previously Presented) The method of claim 1 wherein the fluorine-rich fluorocarbon gas is CF_4, the flow rate is less than about 1000 sccm and the flow ratio of the fluorine-rich fluorocarbon gas to the oxygen-containing gas is less than about 5.

6. (Original) The method of claim 1 wherein the nitrogen-containing gas is nitrogen, the flow rate is between about 5 sccm to about 500 sccm and the flow ratio of the nitrogen-containing gas to the oxygen-containing gas is between about 1 to about 10.

7. (Original) The method of claim 1 wherein the oxygen-containing gas is oxygen and the flow rate is between about 5 sccm to about 500 sccm.

8. (Original) The method of claim 1 wherein the inert gas is argon, the flow rate is between about 20 sccm to about 2000 sccm and the flow ratio of the inert gas to the oxygen-containing gas is between about 1 to about 30.

9. (Previously Presented) The method of claim 1 wherein the sacrificial light absorbing material is 9-anthracene carboxymethyl triethoxysilane (TESAC) dyed methylsiloxane polymer.

10. (Original) The method of claim 1 wherein the sacrificial light absorbing material is formed atop a dielectric material, where the dielectric material is a carbon doped oxide with 1 to 50% atomic weight carbon content.

11. (Previously Presented) The method of claim 1 further comprising:
applying a bias power of less than 1000 watts.

12. (Original) The method of claim 1 wherein the source power is between 50 to 5000 watts.

13. (Original) The method of claim 1 wherein the cathode temperature is maintained between -20°C to 80°C.

14. (Original) The method of claim 1 wherein the process pressure is between 1 mTorr to about 1 Torr.

15. (Original) The method of claim 1 wherein the etch selectivity of the sacrificial light absorbing material over the dielectric material is higher than 5:1.

16. (Original) The method of claim 1 wherein the etch selectivity of the sacrificial light absorbing material over the dielectric material is higher than 10:1.

17. (Previously Presented) The method of claim 1 wherein the etch rate of the sacrificial light absorbing material is greater than 200 angstrom per minute.

18. (Previously Presented) The method of claim 18 wherein the etch rate of the sacrificial light absorbing material is greater than 500 angstrom per minute.

19. (Previously Presented) A method for selectively etching a photoresist material over a dielectric material and selectively etching a sacrificial light absorbing material over a dielectric material on a substrate, comprising:

providing a substrate comprising a photoresist material, a sacrificial light absorbing material, and a dielectric material;

supplying to the process chamber a process gas mixture comprising a hydrofluorocarbon gas, a nitrogen-containing gas, an oxygen-containing gas and an inert gas; and

dissociating and ionizing the process gas mixture to remove the photoresist material and the sacrificial light absorbing material.

20. (Previously Presented) The method of claim 19 wherein the process gas mixture further comprises at least one of a hydrogen-containing gas or a fluorine-rich fluorocarbon gas.

21. (Original) The method of claim 19 wherein the hydrofluorocarbon gas is CH_3F, the flow rate is between about 5 sccm to about 500 sccm and the flow ratio of the hydroflurocarbon gas to the oxygen-containing gas is between about 1 to about 20.

22. (Previously Presented) The method of claim 20 wherein the hydrogen-containing gas is H_2, the flow rate is less than about 500 sccm and the flow ratio of the hydrogen-containing gas to the oxygen-containing gas is less than about 5.

23. (Previously Presented) The method of claim 20 wherein the fluorine-rich fluorocarbon gas is CF_4, the flow rate is less than about 1000 sccm and the flow ratio of the fluorine-rich flurocarbon gas to the oxygen-containing gas is less than about 5.

24. (Original) The method of claim 19 wherein the nitrogen-containing gas flow rate is between about 5 sccm to about 500 sccm and the flow ratio of the nitrogen gas to the oxygen-containing gas is between about 1 to about 10.

25. (Original) The method of claim 19 wherein the oxygen-containing gas is oxygen and the flow rate is between about 5 sccm to about 500 sccm.

26. (Original) The method of claim 19 wherein the inert gas is argon, the flow rate is between about 20 sccm to about 2000 sccm and the flow ratio of the inert gas to the oxygen-containing gas is between about 1 to about 30.

27. (Previously Presented) The method of claim 19 wherein the sacrificial light absorbing material is 9-anthracene carboxymethyl triethoxysilane (TESAC) dyed methylsiloxane polymer.

28. (Original) The method of claim 19 wherein the photoresist is a deep ultraviolet (DUV) photoresist.

29. (Original) The method of claim 19 wherein the sacrificial light absorbing material is formed atop a dielectric material, where the dielectric material is a carbon doped oxide with 1 to 50% atomic weight carbon content.

30. (Original) The method of claim 19, wherein the photoresist is formed atop the sacrificial light absorbing material.

31. (Previously Presented) The method of claim 19 further comprising:
applying a bias power of less than 1000 watts.

32. (Original) The method of claim 19 wherein the source power is between 50 to 5000 watts.

33. (Original) The plasma etch process of claim 19 wherein the cathode temperature is maintained between -20 °C to 80 °C.

34. (Original) The method of claim 19 wherein the process pressure is between 1 mTorr to about 1 Torr.

35. (Original) The method of claim 19 wherein the etch selectivity of the sacrificial light absorbing material over the dielectric material is higher than 5:1 and the etch selectivity of the photoresist material over the dielectric material is higher than 5:1.

36. (Previously Presented) The method of claim 19 wherein the etch selectivity of the sacrificial light absorbing material over the dielectric material is higher than 10:1 and the etch selectivity of the photoresist material over the dielectric material is higher than 10:1.

37. (Previously Presented) The method of claim 19 wherein the etch rates of the sacrificial light absorbing material and the photoresist are greater than 200 angstrom per minute.

38. (Previously Presented) The method of claim 37 wherein the etch rates of the sacrificial light absorbing material and the photoresist are greater than 500 angstrom per minute.

39. (Currently Amended) A plasma etch process for selectively etching a sacrificial light absorbing material over a dielectric material on a substrate, comprising:

providing a substrate comprising a sacrificial light absorbing material and a dielectric material to a process chamber;

supplying to the process chamber a process gas mixture comprising a CH_3F gas flow rate between about 5 sccm to about 500 sccm, a nitrogen gas flow rate between about 5 sccm to about 500 sccm, an oxygen gas flow rate between about 5 sccm to about 500 sccm, an argon gas flow rate between about 20 sccm to about 2000 sccm, and at least one of hydrogen (H_2) at a gas flow rate of less than about 500 sccm or fluorocarbon (CF_4) at a gas flow rate of less than about 1000 sccm, the ratio of CH_3F flow rate to oxygen flow rate is between about 1 to about 20, the ratio of nitrogen flow rate to oxygen flow rate is between about 1 to about 10, and the ratio of Ar flow rate to oxygen flow rate is between about 1 to about 30;

supplying the process chamber with a bias power of less than about 1000 watts and a source power between about 50 watts to about 5000 watts,

maintaining the cathode temperature between about -20°C. to about 80°C and chamber pressure between about 1 mTorr to about 1 Torr; and

dissociating and ionizing the process gas mixture to etch ~~the photoresist and~~ the sacrificial light absorbing material.

40. (Previously Presented) The method of claim 39 wherein a gas flow rate of hydrogen (H_2) or fluorocarbon (CF_4) to oxygen is less than about 5.

41. (Previously Presented) A method for selectively etching a sacrificial light absorbing material over a dielectric material on a substrate, comprising:

providing to a process chamber a substrate comprising a dielectric material having a via formed therein, a sacrificial light absorbing material disposed atop the dielectric material and filling the via, and a photoresist layer disposed atop the sacrificial light absorbing material and patterned to define a trench aligned with the via;

etching the trench into the sacrificial light absorbing material and the dielectric material, wherein at least a portion of the sacrificial light absorbing material remains deposited within the via upon completion of etching the trench; and

removing the photoresist layer and the remaining portion of the sacrificial light absorbing material deposited within the via using a plasma formed from a process gas

mixture comprising a hydrofluorocarbon gas, a nitrogen-containing gas, an oxygen-containing gas, and an inert gas.

42. (Previously Presented) The method of claim 41 wherein the process gas mixture further comprises at least one of a hydrogen-containing gas or a fluorine-rich fluorocarbon gas.